



# THE ATMOSPHERIC RESERVOIR

*Examining the Atmosphere and Atmospheric Resource Management*

## LIGHTNING: How far away is really "safe"?

by Bruce Boe

"Thunder is good, thunder is impressive, but it is lightning that does the work." So penned the ever-observant Mark Twain. Today we know much more about lightning, but most of us treat it more as a nuisance than as a real threat to our safety. *Nationally, most years lightning is the number one weather related killer, ahead of tornadoes, hurricanes, and flash floods.* Lightning doesn't usually get the same press as the other weather dangers, perhaps because it usually claims its victims one at a time.

Lightning is a giant spark whose temperature is typically around 50,000°F, hotter than the surface of the sun.

The channel through which the lightning surges is no more than an inch or so in diameter, but the light from the flash is so intense that it most

often "bleeds" on film, and may appear to be much wider. The typical American home has electrical service rated at 200 amperes; which is more power than the home will use if everything electrical in it is turned on at once, yet lightning flashes may have 1000 times more power! Thunder is simply the expanding shock wave generated by the super-heating of the air. These sound waves travel at about 1100 feet per second. This means that for every 4.8 seconds, the thunder travels one mile. This is very useful information, for if we count the seconds that elapse between seeing the lightning stroke and hearing the thunder, we can divide by 5 and get a useful estimate of how far away the lightning was. Twenty seconds from "flash" to "bang" means 4 miles, eight seconds 1.6 miles, and 2 seconds, less than half a mile! So, at what distance does lightning become a danger?

A few years back, I was setting some metal fence posts in a pasture a quarter mile east of my house. A thunderstorm was approaching from the west. Though I could hear the distant growl of thunder, I had seen no lightning, and the growing thunderstorm towers were still many miles removed. There was cloud overhead, but only high, flat "anvil" blowing from the thunderstorm to the west. I was pressed for time, and only had three more posts to drive. As I completed driving the second of these, from the high cloudiness overhead, a lightning bolt flashed to the ground only a quarter mile *east* of me! Needless to say, the third post waited for another day. My mistake? I had heard the thunder, but

with the pressure (self-induced) to complete the job, I wrongly reasoned that I had time to safely finish. As a meteorologist, I knew that lightning could originate from within the anvil cloud that often precedes thunderstorms, but rationalized that since I had observed none from that particular storm, there wouldn't be any.

So how close can the storm be before you seek shelter? The best rule is if you can hear thunder, get out of the open, whether there is any cloud overhead or not. If you're not near a building, but are near a motor vehicle- get in the vehicle. You'll be fairly safe there, even if it gets struck, because the metal of the car roof or cab will carry the electrical charge safely around you as it passes from the sky into the ground. If you have a convertible or a rag-top, or are working on cab-less farm machinery, all bets are off. Bicycles are no safer. It isn't the rubber tires that make you safe, it is the metal all around you, which will direct the electricity safely away.

Though April-through-September is our usual thunderstorms season, they have been observed in North Dakota every month of the year. In fact, it is often the early- and late-season storms which pose the greater risk, because the public is less aware of the hazard. ■

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